

A REVIEW

BY

ISHAM RANDOLPH

OF

John W. Alvord's "Review

OF THE

Chicago Sanitary and  
Ship Canal

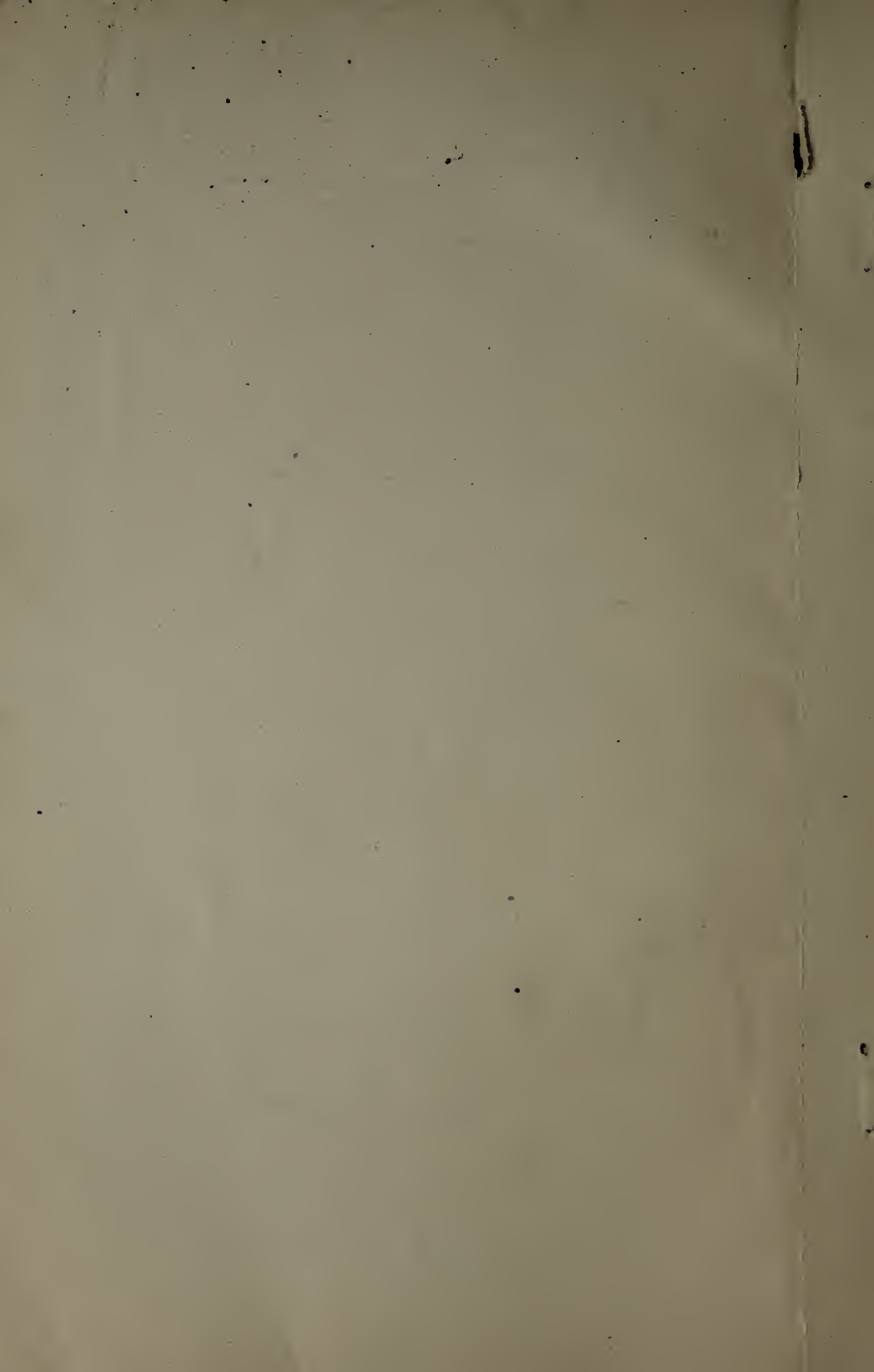
—WITH—

Suggestions  
for a Harbor"

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## A REVIEW by ISHAM RANDOLPH

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### Chicago Sanitary and Ship Canal

WITH SUGGESTIONS FOR A HARBOR

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When false doctrine is promulgated by a false teacher, by word of mouth to a limited audience, it is deprecated by the orthodox; but when that audience is so ignorant of the truth as to be carried away by the sophistries of the speaker and adopt them as a new gospel and print them for wide distribution, then it behooves someone who knows the truth to make use of printer's ink in its defense.

On March 20, 1908, one of my professional brethern addressed the Chicago Real Estate Board, taking as his text the Sanitary District of Chicago. That address was printed for distribution and I had a copy sent me.

The discourse is divided into six heads, which the speaker termed propositions.

PROPOSITION I. reads: "That that portion of the Chicago Drainage channel not useful for sanitary purposes, has already cost the taxpayers of this city \$6,500,000 in interest loss since its completion, and before a waterway can be completed to St. Louis, will cost in interest loss about \$13,000,000 more." This is a broad, flat proposition, and its validity depends upon its truth. Let us see how much consideration it is entitled to.

The Sanitary and Ship Canal traverses the territory between Robey Street and the West Fork of the South Branch of the Chicago River, and Joliet, Illinois; on a route approximately parallel with the old Illinois and Michigan Canal, which was opened for traffic in 1848. This channel passes across the divide between the Lake Michigan water shed and the Desplaines water shed, about seven miles southwest of its beginning at Robey Street, and it has been in operation ever since January 17, 1900. It has revolutionized the health conditions in Chicago. This channel was built under the Sanitary District law of 1889, which fixed certain features of the work and made them conform to the needs of a ship canal. In fact, the motive which induced the lawmakers of Illinois to confer upon Chicago the right to take water from Lake Michigan and discharge it into the Illinois Valley was the creation of a great navigable waterway. The conditions of the Act (Section 23) called for a channel "through a territory with a rocky stratum, where such rocky stratum is above a grade sufficient to produce a depth of water from Lake Michigan of not less than eighteen feet, such portion of said channel shall have double the flowing capacity above provided for (300,000 c. f. m.) and a width of not less than one hundred and sixty feet at the bottom capable of producing a depth of not less than eighteen feet of water." The volume of flow demanded by this law is (Section 20) "at least two hundred cubic feet per minute for each one thousand of population of the district drained thereby."

Our legislators "builded wiser than they knew."

On the statement of Dr. Evans, the Health Commissioner of Chicago, a saving of 16,299 lives in the eight years since 1900 is clearly attributable to the protection afforded to Chicago's water supply by the Sanitary and Ship Canal. Let us see if the after dinner speaker has made himself clear. He says: "Not all of the main drainage channel is useful for sanitary purposes,

nor will it be for many years to come." The channel is an entirety. The stretch from Robey Street to Summit is flowing full, it is carrying sewage, and it is, therefore, useful for sanitary purposes. Take the stretch from Summit to Willow Springs; it is taking all of the effluent from the first stretch of channel considered and carrying it on to its terminus at the Willow Springs Road. Take the stretch from that road to Lockport, the controlling works, all the water and sewage which has come through the first two sections designated flows on through this rock-bound channel. Which one of these three divisions is not useful for sanitary purposes? They are the three sections of a continuous channel which is saving thousands of lives of Chicago's citizens.

The first stretch cost for construction \$4,541,948.42, and for right of way \$1,467,495.91, or a total of \$6,009,444.33.

The cost of the second and third stretch was for construction \$16,298,170.59, and for right of way \$917,336.28, or a total of \$17,215,506.87. From language which follows the last quotation, it is fair to assume that the speaker admits the first stretch of channel from Robey Street to Summit to be "useful for sanitary purposes."

Let us see what he says:

"To obtain that portion which must be thus credited, we may roughly estimate the alternative cost of pumping the *present* flow for dilution purposes across the divide at Summit, supposing the main channel itself not to exist, and conceiving an outlet like the present diversion channel would convey away the waters. Large pumping stations would be necessary to do this, and some channels for conveying the water to them. The annual cost of pumping the present flow based upon experience of the Milwaukee flushing tunnel, and including all fixed charges and operating expenses, may be roughly taken as about one million dollars a year. This represents fairly well the value of the channel for sanitary purposes, for in every respect it would answer precisely



as the present channel does now, except that of navigation. The present flow would be maintained, and the present water power at Lockport would be available." It is clear then on the showing made that the stretch of channel from Robey Street to Summit is necessary. So with some reductions in cost. By substituting fixed bridges, we may exclude that cost from the expenditure on which an interest charge of \$6,500,000 has accumulated. Under his substitute plan, on his own showing, the annual cost will be \$1,000,000. Now \$1,000,000 at 5 per cent is the interest on \$20,000,000. The cost of the main channel from Summit to Lockport ~~plus the cost of the river diversion~~ has been shown to be \$17,215,506.87. This sum, however, does not include the cost of river diversion, \$1,142,578.32, which is necessary to the success of his project.

Now the interest on \$17,215,506.87 at 5 per cent is \$860,775.34, so that for his proposed pumping proposition the District would, on his showing, pay \$139,224.66 more annually than it now does for a *deep waterway and a gravity flow of sewage*. But this is not all. He bases his estimate of cost upon the experience of the Milwaukee flushing station. The pump in that case simply pumps against a head sufficient to drive a few thousand cubic feet of water through a conduit; certainly the head would not exceed two feet, whereas he proposes to lift 300,000 cubic feet per minute eighteen feet, by pumps. He proposes to discharge this volume of water into the river diversion channel; a channel which is taxed to its limit now in times of high water. The proposition is impracticable unless several millions of dollars are expended in giving the river diversion channel a capacity adequate to care for the maximum flood water—some 800,000 cubic feet a minute—with the pumpage added.

PROPOSITION II. "That the Sanitary District of Chicago, by delaying prompt improvement of the South Branch of the Chicago River to a width of 200 feet, and by altogether neglecting to care

for the flood waters of the Desplaines River and the North Branch, as intended by the designers of the Channel, are imperiling the sanitary condition of this city by allowing the polluted waters of the North Branch to reach the lake during every serious flood."

This proposition assumes that the Sanitary Trustees, after having adopted a plan, are all powerful to push it through regardless of financial ability to pay for what they must take and of the slow legal processes by which property rights must be acquired. It is desirable to have the Chicago River plans as recommended by me and adopted by the Trustees in 1901, carried to early completion, and to that end the Trustees are working steadily and uncompromisingly. The charge that the polluted waters of the North Branch reach Lake Michigan in every serious flood is not denied, but the fact remains that this has seldom occurred during eight years of service and the duration of outward flow has been very brief, and it has never been a serious menace, as there is no evidence that this slight pollution ever reached any of the city intake cribs. From page 8, I quote: "A complication arises in connection with the Desplaines River which has a flood flow rising at times to 850,000 c. f. m. This quantity of water, if it were carried away to Lockport in a channel capacious enough to convey it, would require a channel as large as that of the present Drainage Canal." The speaker did not seem to be awake to this state of affairs when he suggested his pumping scheme under Proposition No. I.

The River Diversion Channel has never been completed as designed. The dam south of Riverside has never been built to its full height, and in consequence, after the flood volume reaches 275,000 cubic feet per minute, a part of the excess flood flows over this dam and via the "Ogden Ditch" into the main channel at Kedzie avenue.

PROPOSITION III. "That the law of 1903, adding the Calu-

met and Evanston Districts to the main problem, urged as it was by the Sanitary District upon the legislature, is a most serious complication to an already difficult situation, involving us in a premature expenditure probably exceeding \$25,000,000, which only in the slightest degree helps our sanitary situation at the present time. Other and entirely practicable methods of sewage disposal would fully solve the sanitation of these districts at one-third of this cost, either on the basis of first cost or operating expenses with water power assets included."

This is a debatable proposition, and as far as the debate has gone I believe the Sanitary District's plans are sustained. The speaker showed himself so radically incapable of just judgment and fair statement in Proposition No. I, that the thoughtful and conservative will take what he says on Proposition No. III *cum grano salis*. He, on page 12, refers to a letter of mine to the editor of the Engineering News under date of December 6, 1898. The letter is of record, and I have no qualifying statements to make.

I pass on to pages 18-19, in which he takes hold of an indefensible statement put forth by the Sanitary District as to the cost per horsepower of water power, which is given as \$26.40. But it suits his purpose to adopt an indefensible statement, and he does it with alacrity; but publishes a table which convicts him of knowing the true conditions. This is the table:

Sanitary District Estimate of Cost of Water Power, January 1, 1907.

Total first cost of development and transmission lines.....	\$3,500,000.00
Fixed charges, interest at 4 per cent..	\$140,000.00
Depreciation .....	21,137.94
Operating expenses, station labor....	63,240.00
Operating expenses, repairs.....	3,700.00
Operating expenses, incidentals.....	1,200.00



Operating Lawrence Ave. pumping sta.	43,960.00
Operating 39th Street pumping station	120,380.00
Interest loss on 39th St. pumping sta.	15,599.00

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Total cost of operation:.....\$409,217.70

With 15,500 horsepower delivered at the substation, the cost per horsepower for twenty-four hour service, per annum, will, therefore, be \$26.40."

Now certainly the speaker—who has had to do with matters of this kind for too long a time to be ignorant of the simple matters set forth in this statement—knows that

Operating Lawrence Ave. pumping station.....	\$ 43,960.00
Operating 39th Street pumping station.....	120,380.00
Interest loss on 39th Street pumping station.....	15,599.00

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A total of.....\$179,939.00

has nothing to do with the cost of developing water power at Lockport. Deducting \$179,939.00 from \$409,217.70, we have \$229,278.70 as the proper charge against cost of production, which divided by 15,500 gives \$14.70 as the cost per horsepower. He also knows (perhaps he does not) that the power works were designed for more than twice 15,500, and that to produce the greater horsepower, when the water is available, involves a very moderate additional outlay for machinery and a very small increase in the cost of operation, so that the cost per horsepower per annum will be greatly reduced, and the salable output will yield a very large net return on the investment.

"Indiana Navigation. PROPOSITION IV. That the Calumet District and all of Northern Indiana to Michigan City may and can have all of the inland navigable channels they need and can pray for, without an outlet through the Sag Valley independent of the main channel, provided they can obtain federal

permission, but they should not be built under the guise of sanitation if other methods of sewage disposal are more economical and practicable."

But for the last paragraph in the argument following this pronouncement, I would let it pass without comment. That last paragraph reads: "My own feeling is that we have a 'Water Power' Commission rather than a Sanitary Commission, and that our authorities charged with the responsibilities of sanitation have come to look so eagerly for revenue to meet the large interest charges, administration and maintenance charges of the channel which has been already created, that they have lost sight of the responsibilities of sanitation, and are unduly eager for water power."

Does the speaker see in the revenue to be derived from water flowing through the proposed Calumet-Sag Canal, any incentive for the building of that canal?

Four thousand c. f. s. of water falling thirty-four feet will yield a theoretical horsepower of 15,454. At the very outside, 75 per cent of this power, or 11,591 horsepower, would be available for sale. If this could be sold at \$25.00 per horsepower, the income would be only \$289,762.00, which capitalized at 5 per cent means interest on \$5,795,220.00. My estimate of the cost of the channel which will produce this flow and power is \$13,326,045.00. Does the bait of water power, think you, tempt the Sanitary District authorities to build the Calumet-Sag Canal? No. That is the best method, all things considered, of caring for the sewage of the Calumet region and preventing Lake Michigan from being contaminated by the Calumet River.

"PROPOSITION V. The Chicago River and South Branch, when the present project is completed by the Sanitary District, will be as wide as the Panama Canal on the Culebra Cut, and will have a current materially less than the St. Clair River, through

which passes nearly all of the tonnage of the Great Lakes. Subway plans now maturing will send more and more travel beneath it than over it, and many of the bridges now spanning it may properly be replaced with tunnels. This will make it a fitting entrance to the lakes and gulf waterway of the future, and its progressive improvement for this end should be the aim of every Chicago energy available."

On this proposition I have no adverse criticism to make.

"PROPOSITION VI. The advantageous harbors of the world are located where traffic interchange of all types can most economically meet and do business together.

The South Branch of the Chicago River in the vicinity of Bridgeport and the Drainage Channel west to Summit, present singularly good opportunities for creating a great inland harbor, meeting all of these requirements. A broadened channel, with all necessary slips, incoming and outgoing channels, docks, rail facilities, belt line connections, may be created in this comparatively undeveloped territory at a minimum of expense and a maximum of convenience to all present interests and with the least possible dislocation of present commerce and civic growth."

I have the strongest belief in the importance and the value of the Chicago River and the Sanitary & Ship Canal, to which it is the entrance from the Lakes. The value of these to the commerce of Chicago cannot be overestimated. These channels are admirably adapted to certain navigation uses, but they cannot supply the growing need of an adequate harbor on the Lake Front. Our speaker quoted from *a great authority*, thus: "A great authority on ports has said, 'that a port is a commercial enterprise and ought to be treated as such. It will be successful if proper accommodations for requirements of trade be given. That is to say, that the ever increasing draught and sizes of vessels is looked after, and the proper facilities for putting cargoes aboard and ashore are arranged.'"

Exactly so, and here Chicago has fallen down.

Our speaker says: "My objections to a harbor on the Lake Front would be that it would turn the city upside down and inside out, and everything would have to be re-arranged in ways that are hardly capable of being foreseen or thought of." The problem is a large one, and however solved, it means a vast outlay of money, but the end to be obtained is worth the cost, be that what it may.

The speaker is not happy in his selection of comparisons in support of his plea for a harbor at the back door of the city. First he takes London. This city, he says, has expended \$185,000,000 on its docks. No seagoing vessel goes further up the Thames than London Bridge. The only bridge crossing the Thames through which vessels pass is the Tower Bridge, a bascule structure. The Thames River at London Bridge, the head of seagoing navigation, is 800 feet wide, and at Woolwich it is 1,470 feet wide. Next he cites Glasgow, which has secured a harbor on the Clyde at a cost of \$42,500,000. Glasgow is on the right bank of the Clyde and has no bridges hampering its commerce. Next he cites Hamburg, which has expended \$85,000,000 on its harbor. Hamburg is on the right bank of the Elbe River, about ninety-three miles from the North Sea. It has five miles of dock front, and seagoing commerce does not pass beyond the bridges which are fixed.

Next comes Antwerp, which has spent \$45,000,000 for its harbor on the River Scheldt, a stream 2,200 feet wide and thirty to forty feet deep. Finally he cites Newcastle, which with geographic inaccuracy he locates upon the Thames. I find it on the Tyne. This is the Newcastle which suggests "carrying coals." He says that the river improvement here has cost \$32,000,000. Newcastle is on the right bank of the Tyne, and is reached from the opposite bank by two bridges; the Hydraulic Bridge, which is a movable structure, and the High Level Bridge,

which has six spans 138-10 c. to c.; four of these openings span the navigable waterway, and the clear headroom under ~~all~~ <sup>one</sup> of them is 112 feet 6 inches.

There is no great port in the world which must be reached by passing through the heart of a populous city. A harbor in the water front is a necessity for any maritime city.

The speaker closes with a little moralizing, mighty good, too. He says: "In conclusion, I may suggest that there never was a time when Chicago needed trained and skilful forethought more than at the present time. Creative imagination, by trained and practical minds, will produce satisfactory results for the future of this city as nothing else will do. Let us not make the dirt fly until we have thought it out. It is better to be sure than to be sorry. Above all, let us not regard differing points of view with personal animosity, and get and give light in a patriotic spirit. To see on all sides before we leap, is a lesson I would have everyone draw from this brief review of a great project."

I would simply add: *Let us try to know what we are talking about when we use our vocal powers.*



